

REMARKS

Applicants acknowledge receipt of an Office Action dated August 11, 2003. In this response Applicants have amended claims 1 and 23 and have cancelled claim 9 as well as non-elected claims 14-22, 27-32, 34 and 36 without prejudice or disclaimer. Support for the amendments to claims 1 and 23 may be found in the specification, *inter alia*, at paragraph [0055]. Following entry of these amendments, claims 1-8, 9-13, 23-26, 33, 35 and 37 are pending in the application.

Reconsideration of the present application is respectfully requested in view of the foregoing amendments and the remarks which follow. It is respectfully requested that this after final amendment and reply be considered and entered, since it is believed to place this application in condition for allowance.

Rejections Under 35 U.S.C. §103

On page 2 of the Office Action, the PTO has rejected claims 1 to 13, 23-26, 33, 35 and 37 under 35 U.S.C. 103(a) as being unpatentable over either U.S. Patent 5,395,459 to Pinkerton *et al.* (hereafter "Pinkerton") or U.S. Patent 5,425,818 to Hirosawa *et al.* (hereafter "Hirosawa"). Applicants respectfully traverse this rejection for the reasons set forth below.

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 180 USPQ 580 (CCPA 1974). See MPEP §2143.03.

In this response, Applicants have amended claims 1 and 23 such that each now recites that the giant magnetostrictive material comprises "a composition represented by the formula: $R(T_xM_{1-x})_z$ wherein R denotes at least one element selected from rare earth elements including Y, wherein T denotes at least one element selected from the group consisting of Fe, Co and Ni, wherein M denotes at least one element selected from transition elements other than Fe, Co and Ni, and wherein X and Z are numbers satisfying $0.5 \leq X \leq 1$ and $1.4 \leq Z \leq 2.5$, respectively. Applicants note that claim 37 recites that "the mother alloy comprises a

Laves phase as a primary phase”. Here, *neither* Pinkerton *nor* Hirosawa, taken individually (Applicants note that the PTO’s rejection does not rely on any combination of these references) teaches or suggests these features of claims 1, 23 and 37.

In contrast to the presently claimed invention, Pinkerton relates to a method of making an alloy having a nitrified $\text{Sm}_2\text{Fe}_{17}$ structure consisting of N, Sm and Fe (see, for example, claim 1 of Pinkerton). Pinkerton’s method includes the steps of a) forming a molten alloy consisting of Sm and Fe in atomic ratio of about 1:4 to about 1:9, b) quenching the molten alloy --, c) comminuting - - and nitrifying the communicated alloy ribbon - - to provide the nitrified $\text{Sm}_2\text{Fe}_{17}$ structure consisting of N, Sm, and Fe. In column 1, lines 45-48, Pinkerton states that “samarium and iron are each provided in an amount sufficient to produce an atomic proportion of about 1:4 to about 1:9 of samarium to iron (Sm : Fe).” Further, in Example 1, Pinkerton discloses a final ribbon composition (melt-spun ribbon) having a Sm:Fe ratio of about 14.5:85.5 (column 5, lines 2-3). As mentioned above, Pinkerton relates to nitrified $\text{Sm}_2\text{Fe}_{17}$ structures having a high coercive force, such as 15kOe or more.

With respect to SmFe_2 , Pinkerton states that “[c]ubic SmFe_2 is present in the as quenched ribbon as **impurity** phase” (Emphasis added) (column 6, lines 46-47), and “[u]pon nitrifying for four hours at a temperature of 475°C, as per Example 1, the $\text{Sm}_2\text{Fe}_{17}$ peaks shift to lower angles as nitrogen diffuses into the $\text{Sm}_2\text{Fe}_{17}$ lattice to form $\text{Sm}_2\text{Fe}_{17}\text{N}_x$ (Fig. 3(b)). . . [t]he SmFe_2 peaks disappear” (column 6, lines 53-61). Thus, Pinkerton fails to disclose or properly suggest a SmFe_2 structure having Sm, Fe and N as a magnetostrictive material.

Turning now to Hirosawa, Hirosawa relates to a rare earth-iron-nitrogen system permanent magnet obtained from a powder of a $\text{Th}_2\text{Zn}_{17}$ compound containing nitrogen in interlattice sites and to a process for producing the same. In column 2, lines 38-52, Hirosawa clearly describes that “[t]he present invention provides a rare earth-iron-nitrogen permanent magnet containing a phase having a $\text{Th}_2\text{Zn}_{17}$ type crystal structure as the principal phase, comprising a composition expressed by a formula $\text{T}_{100-x-y}\text{R}_x\text{N}_y$, wherein T represents Fe or Fe containing 20% or less of Co or Cr, R represents at least one rare earth element inclusive of

Y, provided that Sm accounts for 50 atm. % or more, and x is in the range of 9 to 12 atm %, and y is in the range of from 10 to 16 atm. %, and having an apparent density accounting for 90% or more of the true density.” For example, Table 1 of Hirosawa et al. discloses example 1 having a composition of $\text{Sm}_{9.2}\text{Fe}_{77.4}\text{N}_{13.4}$. Thus, the compositions of Hirosawa are fundamentally different from the alloy magnetostrictive material of the present invention.

With particular regard to claim 13, Applicants note that neither Pinkerton nor Hirosawa teaches or properly suggests a giant magnetostrictive material whose dimensions vary at an application of an external magnetic field wherein the giant magnetostrictive material has a giant magnetostriction of 200 ppm or more.

As recited in claim 37, the giant magnetostrictive material of the present invention comprises a mother alloy consisting essentially of a rare earth element and a transition element and having a Laves phase as a primary phase, and nitrogen comprising an interstitial nitrogen that dissolved interstitially in the lattice of the primary phase, that is, Laves phase, and a nitride-forming nitrogen. Laves phases are alloy phases which have the general formula AB_2 (For example, McGraw-Hill, Dictionary of Scientific and Technological Terms).

In contrast to present claim 37, Pinkerton discloses an alloy having a nitrified $\text{Sm}_2\text{Fe}_{17}$ structure, consisting of N, Sm and Fe (for example, claim 1). Similarly, Hirosawa discloses a rare earth-iron-nitrogen permanent magnet obtained from a powder of a $\text{Th}_2\text{Zn}_{17}$ type compound. Therefore, these references fail to teach a giant magnetostrictive alloy having a Laves phase as a primary phase.

With respect to dependent claims 2 to 8, 10-12, 24-26, 33, and 35, Applicants submit that each of these claims is allowable for the same reasons as the independent claim from it depends.

In view of the forgoing amendments and comments, applicants respectfully request reconsideration of the rejections of the present invention.

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CONCLUSION

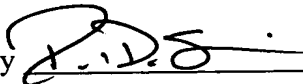
In view of the foregoing amendments and remarks, Applicants respectfully submit that all of the pending claims are now in condition for allowance. An early notice to this effect is earnestly solicited. If there are any questions regarding the application, the Examiner is invited to contact the undersigned at the number below.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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By 

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